ALGEBRA.

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84. Proposed by B. F. YANNEY, A. M., Professor of Mathematics, Mount Union College, Alliance, Ohio.

On the present electoral basis, if all the electoral votes of each state are cast solid for one or the other of two presidential candidates, how many combinations of states are possible for a total of 273 votes for the winning candidate?

No solution of this problem has been received.

85. Proposed by J. M. COLAW, A. M., Monterey, Va.

Sum the infinite series,

$$\frac{1}{1^2.2^2.3^2.4^2.5^2}+\frac{1}{2^2.3^2.4^2.5^2.6^2}+\frac{1}{3^2.4^2.5^2.6^2.7^2}+, \text{ etc.}$$

I. Solution by G. B. M. ZERR, A. M., Ph. D., Professor of Science in Chester High School, Chester, Pa.

Let $V_m=1/[n^2(n+1)^2 \ldots\ldots (n+m)^2]$.

$$\text{Then } V_m=\frac{2m-1}{m^3}\left[\frac{1}{n^2.(n+1)^2\ldots.(n+m-1)^2}+\frac{1}{(n+1)(n+2)^2\ldots.(n+m)^2}\right]$$

$$+\frac{1}{m^3(m-1)}\left[\frac{2}{(n+1)^2\ldots.(n+m-1)^2}-\frac{1}{n^2\ldots.(n+m-2)^2}-\frac{1}{(n+2)^2\ldots.(n+m)^2}\right].$$

Now let $S_m=\Sigma V_m$.

$$\therefore\ S_m=\frac{2m-1}{m^3}\left[S_{m-1}+\left(S_{m-1}-\frac{1}{m^2\,!}\right)\right]$$

$$+\frac{1}{m^3(m-1)}\left[\left(2S_{m-2}-\frac{2}{(m-1)^2\,!}\right)-S_{m-2}-\left(S_{m-2}-\frac{1}{(m-1)^2\,!}-\frac{1}{m^2\,!}\right)\right].$$

$$\therefore\ S_m=\frac{4m-2}{m^3}.S_{m-1}-\frac{2m-1}{m^3.(m^2)!}-\frac{1}{m^3(m-1)}\left[\frac{1}{(m-1)^2!}-\frac{1}{m^2\,!}\right]$$

$$=\frac{4m-2}{m^3}S_{m-1}-\frac{2m-1}{m^3.(m^2)\,!}-\frac{m^2-1}{m^3(m-1).(m^2)\,!}$$

$$=\frac{4m-2}{m^3}S_{m-1}-\frac{1}{m^3.(m^2)!}\left[(2m-1)+(m+1)\right]$$

$$=\frac{4m-2}{m^3}S_{m-1}-\frac{1}{m^2.(m^2)!}=\frac{1}{m^2}\left[\frac{4m-2}{m}S_{m-1}-\frac{3}{m^2\,!}\right].$$

$$\text{Now } S_0=\frac{1}{1^2}+\frac{1}{2^2}+\frac{1}{3^2}+\frac{1}{4^2}+\ldots.\frac{\pi^2}{6}.$$